Macrophage differentiation from embryoid bodies derived from human embryonic stem cells.

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Public Summary:

Scientific Abstract:
Human embryonic stem cells can differentiate into CD34+ hematopoietic progenitors by co-culture on murine feeders such as OP9 and S17. These CD34+ progenitors can be further differentiated into several cells of the hematopoietic lineage including macrophages. However, co-culture on murine feeders is time consuming and involves extensive manipulations. Furthermore, CD45 expression is low on hematopoietic cultures derived from stromal co-cultures. In this study we describe a novel and highly efficient system of generating differentiated macrophages from hematopoietic progenitors generated from embryoid body cultures of human embryonic stem cells. The hematopoietic progenitors generated from these embryoid bodies express higher numbers of CD45+ cells and are able to differentiate to macrophages when cultured in presence of cytokines. Using this system we were able to generate higher yields of CD14+ macrophages compared to traditional stromal cell culture methods. The embryoid body derived macrophages are phagocytic, respond to Toll-like receptor stimulation and express phenotypic markers of mature macrophages. Importantly, the embryoid body system generates hematopoietic progenitors suitable for clinical use by eliminating the need for murine feeder cells. Furthermore, this system is amenable to genetic manipulation and may thus be used to study important mechanisms of macrophage differentiation and function.